DISCOVERY AND IDENTITY OF 110-YEAR-OLD HUTTON COLLECTION OF SOUTH AUSTRALIAN BRYOZOA

D. P. GORDON & S. A. PARKER

GORDON, D. P. & PARKER, S. A. 1991. Discovery and identity of 110-year-old Hutton Collection of South Australian Bryozoa. *Rec. S. Aust. Mus.* 25(2): 121–128.

A long-overlooked collection of bryozoans from South Australia described by Hutton in 1878 has been discovered and examined. Identifications are given for the species in the collection, with annotations. Although most of Hutton's names are junior synonyms of earlier-named species, two are senior and necessitate nomenclatural changes: *Adeonellopsis zietzii* (MacGillivray, 1889) becomes *A. baccata* (Hutton, 1878) and *Pyripora polita* (Hincks, 1880) becomes *Mychoplectra poculo* (Hutton, 1878).

D. P. Gordon, New Zealand Oceanographic Institute, Division of Water Sciences, DSIR, Private Bag, Kilbirnie, Wellington 3, New Zealand, and S. A. Parker, South Australian Museum, North Terrace, Adelaide, South Australia 5000. Manuscript received 20 August 1990.

Examination of a collection of South Australian Bryozoa in the Otago Museum, Dunedin, New Zealand has yielded information on the identity of several nominal taxa that affects modern nomenclature. The collection, overlooked for 110 years, was discovered in 1988 following an enquiry from one of us (S.A.P.) as to its probable whereabouts.

Frederick Woollaston Hutton, an English-born and -educated geologist, was an important contributor to nineteenth-century New Zealand science. During his various appointments he had found it necessary to become a botanist and zoologist as well and described a wide range of organisms, including birds, fishes, molluscs, insects, worms, hydroids and Bryozoa. When, in 1876, he was appointed Professor of Natural Science at Otago University, he also had charge of the Otago Museum, which as Director and Curator he practically founded. While in this capacity, he received from Professor Ralph Tate, an Honorary Member of the Royal Society of Tasmania, a collection of bryozoans from the shores of Gulf St Vincent, South Australia. Hutton (1878) briefly described most of these, naming six as new. Unfortunately, none was illustrated and, probably for this reason, the identity of all but one of the new species has been unrealised. Further, the specimens remained unexamined in the Otago Museum for 110 years.

The collection comprises 20 species. Two are not mentioned in Hutton's (1878) paper whereas some other species mentioned in the paper are not in the collection. One to several specimens of each species was contained in a folded piece of paper with only a number to identify it. On a separate piece of paper in the same box as the specimens and in Hutton's faded inked handwriting was a key to the number with names alongside, the new species' names in pencil only (one new species-name was subsequently changed in Hutton's paper but identifiable nonetheless). All of the specimens have now been labelled and registered (numbered A.88.148 to A.88.172 in the Otago Museum register). All six of Hutton's new species are represented. Hincks (1881) recognised that one was a senior synonym of a species described by himself in 1880. Now that the identities of the remaining five are known for the first time, it is apparent that two currently used names will have to drop into synonymy.

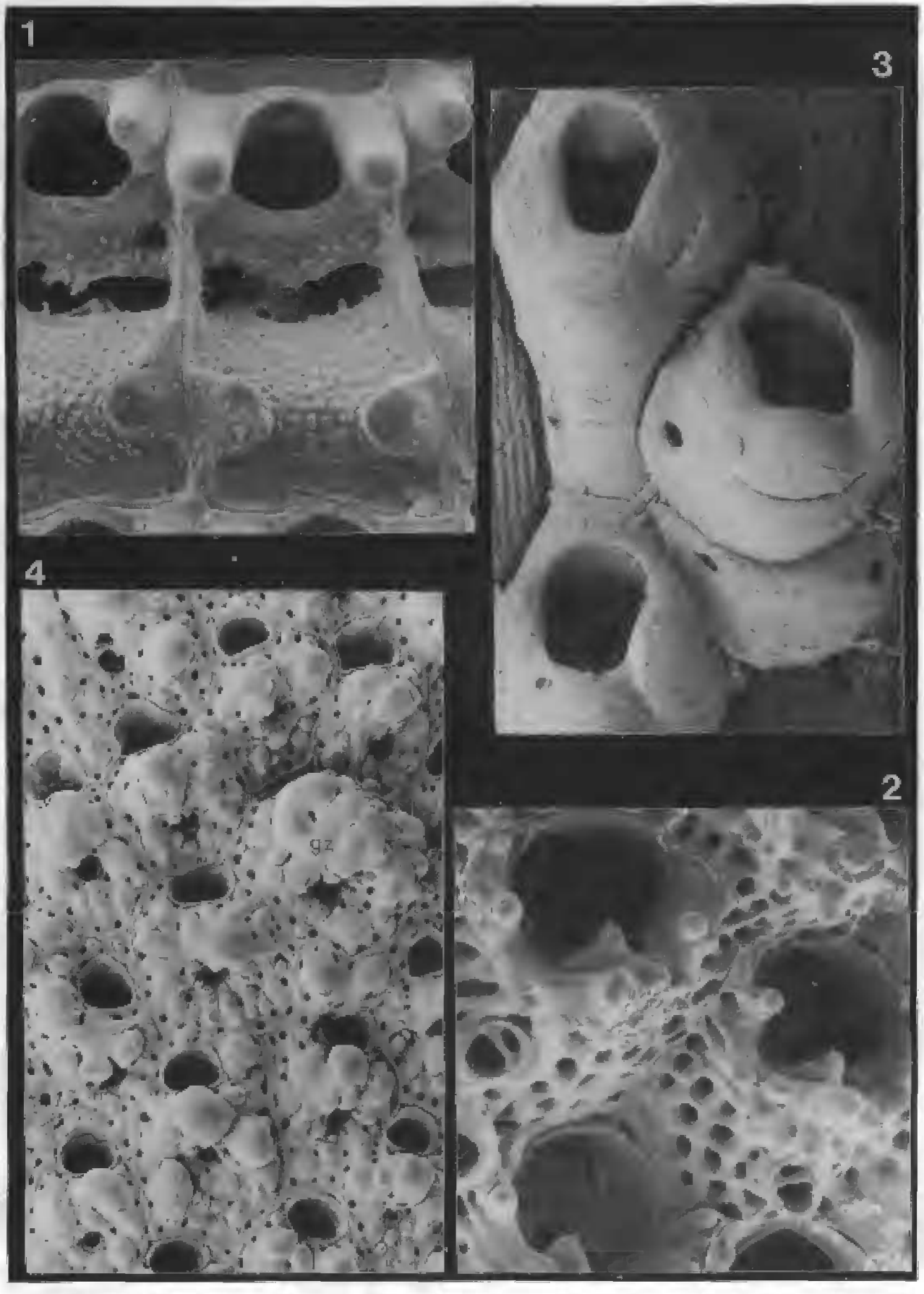
Revision of Hutton's List

In Hutton's (1878) three-page paper, 23 species are listed, nine of them (including the two resuscitated) accompanied by descriptive annotations. All are listed below, in the same order. For the 20 species still present in the Otago Museum collection, revised identifications are given where necessary. Registration numbers are given at the end of each entry.

1. *Caberea rudis*: ***Caberea grandis*** Hincks, 1881 [*non Amastigia rudis* (Busk, 1852)]. A.88.166.

2. *Membranipora lacroixi* [sic]. No specimen in collection. *M. lacroixii* Audouin, 1826 is currently regarded as a synonym of the extra-Australian *Conopeum reticulum* (Linnaeus, 1767).

3. *Membranipora (?) cincta*: ***Diploporella alata*** (Lamouroux, 1821), formerly *Thairopora cincta* (Hutton, 1878) (Fig. 1). Use of the generic name *Diploporella* MacGillivray, 1885a follows Soule *et al.* (1991), who reseparated this genus from *Thairopora*. Use of the trivial name *alata* follows Gordon & Parker (1991). *D. alata* is also a senior synonym of *Membranipora transversa* Hincks, 1880. A.88.161, holotype of *Membranipora (?) cincta* Hutton.


1
3
4
gz
2

4. *Lepralia candida*: ***Arachnopusia unicornis*** (Hutton, 1873) [*non Fenestrulina candida* (MacGillivray, 1860a)]. A.88.163.

5. *Lepralia elegans*: ***Adeonellopsis sulcata*** (Milne Edwards, 1836) [*non Hippoporina elegans* (MacGillivray, 1860b)]. A.88.168.

6. *Lepralia tatei*: ***Didymosella larvalis*** (MacGillivray, 1869). A.88.158, holotype of *Lepralia tatei* Hutton.

7. *Lepralia spicea*: ***Mucropetraliella ellerii*** (MacGillivray, 1869) (Fig. 2). A.88.162, holotype of *Lepralia spicea* Hutton.

8. *Lepralia baccata*: ***Adeonellopsis baccata*** (Hutton, 1878) (Figs 4–7). Senior synonym of *Adeonellopsis zietzii* (MacGillivray, 1889). This little-known species, purplish in life, encrusts small algae and stems of the cymodoceacean seagrass *Amphibolis*. It is strictly encrusting, unlike the similarly coloured *A. sulcata*, which can begin as an encrusting form but later gives rise to bilamellar lobes. *Adeonellopsis baccata* is also readily distinguished from other *Adeonellopsis* species by its zooidal morphology – the autozooidal spiramen is single, sometimes slightly stellate, whereas that of the female zooid is compound, generally with three pores. Avicularia are rare, and the zooidal surface is knobbly, with cauliflower-like excrescences. A.88.159, holotype of *Lepralia baccata* Hutton.

9. *Lepralia pocula*: ***Mychoplectra pocula*** (Hutton, 1878) (Fig. 3). Senior synonym of *Membranipora polita* Hincks, 1880 and type species of the genus *Mychoplectra* Gordon & Parker, 1991. A.88.160A, lectotype and A.88.160B, paralectotype of *Lepralia pocula* Hutton (see Gordon & Parker, 1991).

10. *Cellepora agglutinans*: ***Celleporaria cristata*** (Lamarck, 1816). *Celleporaria agglutinans* (Hutton, 1873), widely distributed in New Zealand, is not known from Australia. In zooidal features the two species are very similar, but *C. cristata* typically forms bilamellar lobes with a crest. One of the most consistent differences between *C. agglutinans* and *C. cristata* is the insignificant or scarcely evident condyles of the autozooidal orifice in the former compared with the stout condyles in the latter (*cf.* Gordon 1989, plate 16D). Both species have a ligula on the crossbar of the columnar avicularium, like that in *C. fusca* (Busk, 1854), but *C. fusca* has a toothed rostrum (cf. Bock 1982, fig. 9.17J). A.88.167.

11. *Cellepora edax*: ***Calyptotheca lata*** (MacGillivray, 1883) [*non Hippoporidra edax* (Busk, 1859); *non Hippoporidra lusitania* (Taylor & Cook, 1981)]. A.88.156.

12. *?Cellepora tubigera*: ***Celleporaria cristata*** (Lamarck, 1816) [*non Turbicellepora tubigera* (Busk, 1859)]. A.88.152, 153, 154, 170.

13. *Eschara contorta*: ***Parasmittina unispinosa*** (Waters, 1889a) [*non Escharoides contorta* (Busk, 1854)]. A.88.172.

14. *Eschara* (?) *huttoni*: ***Calyptotheca variolosa*** (MacGillivray, 1869) (Fig. 8). Senior synonym of *Schizoporella biurrita* Hincks, 1884 and *Schizoporella baccata* Maplestone, 1913 (P. E. Bock, *in litt.* 1988); replacement name for Hutton's original *Eschara tatei*, preoccupied (*vide* Tate's footnote to Hutton 1878: 24). Illustrated by SEM as *Gigantopora biurrita* in Bock (1982; see also Bock's 1987 *Corrigenda*). A.88.157, holotype of *Eschara* (?) *huttoni* Tate *in* Hutton.

15. *Retihornera foliacea*: ***Hornera foliacea*** MacGillivray, 1869. A.88.175.

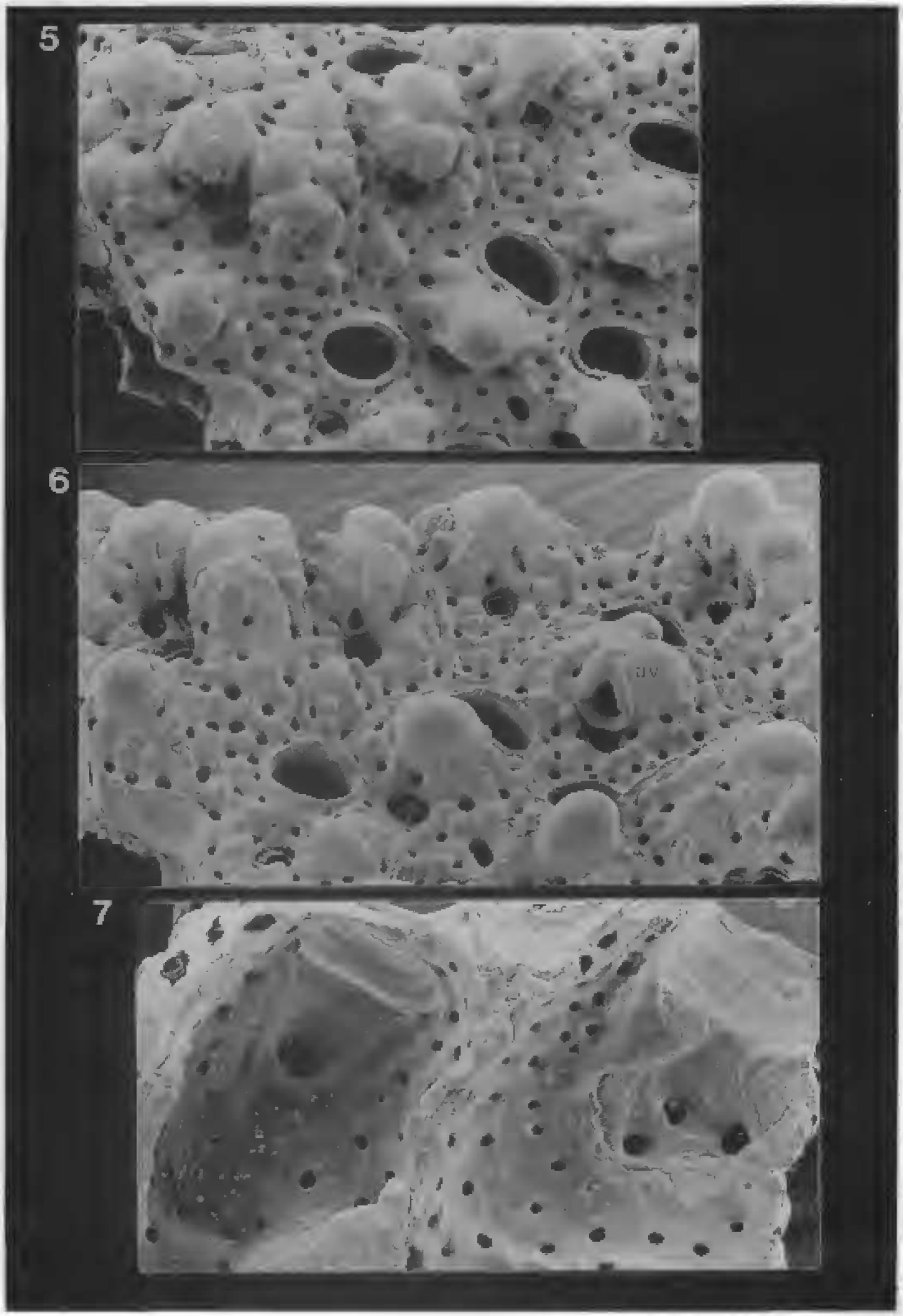
16. *Retepora cellulosa*: **Triphyllozoon munitum** (Hincks, 1878) (*non Retepora cellulosa* Smitt, 1868, *non* Linnaeus, 1758). A.88.165, 173.

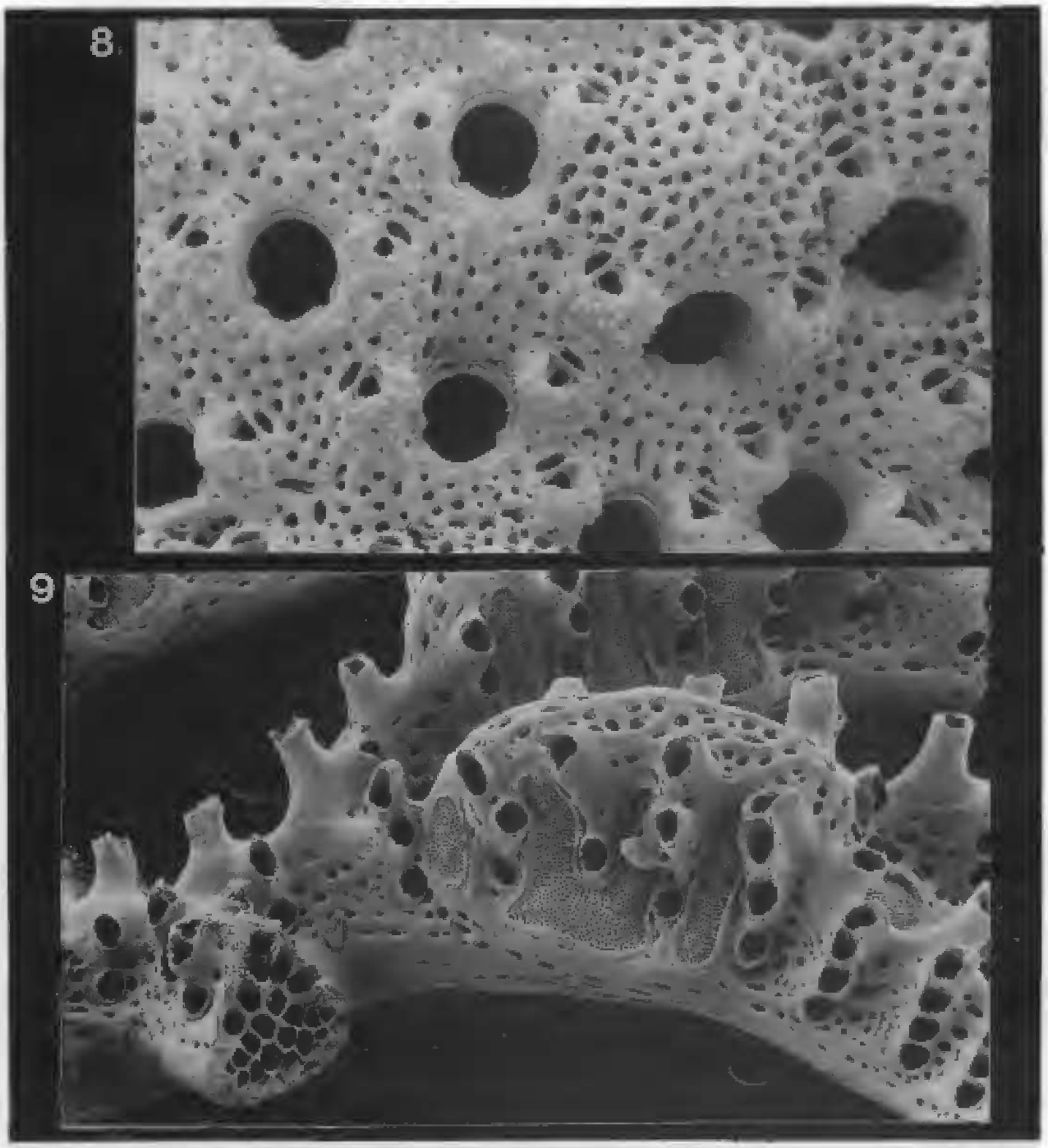
17. *Retepora phoenica* [*sic*]: ***Petralia undata*** MacGillivray, 1869 [*non Iodictyum phoeniceum* (Busk, 1854)]. A.88.171.

18. *Vinculari* [*sic*] *maorica*: ***Cellaria australis*** MacGillivray, *in* McCoy, 1880: 48 (*non Vinularia maorica* Stoliczka, 1865, = *Chaperia* sp., *fide* Brown 1958: 39). A.88.169.

19. *Idmonea radians*: ***Mesonea radians*** (Lamarck, 1816) (Fig. 9). *Mesonea radians* (see Hastings 1932; Bock 1982) is the correct name for this species, which has often been referred to as *Crisina radians*. The type species of *Crisina* is *Crisina normaniana* d'Orbigny 1851, Cretaceous, Europe, which is clearly distinguished from *Mesonea radians*, a Recent species, by the distribution and arrangement of pores and by the construction of the ovicell (Voigt 1984). *Mesonea* (Canu & Bassler, 1920) has pores on frontolateral faces of branches as well as dorsally, and the ovicell has smooth, membrane-covered porous areas. *Crisina* has only dorsal pores in longitudinal furrows and the ovicell lacks the porous areas (Voigt *in litt.*, 1988). There appear to be several species from the Indian and Pacific Oceans, with a *Crisina*-like colony form, that have been attributed to *Crisina radians*. Waters (1887), Harmer (1915), and Bock (1982) have illustrated Lamarck's (1816) species, but those of Brood (1976) from East Africa, of Ryland (1984) from Fiji, and of Soule *et al.* (1987) from Hawaii are neither conspecific nor even congeneric with it. Clearly there is an amount of work to be done in sorting out the Indo-Pacific 'crisiniform' bryozoans. A.88.164.

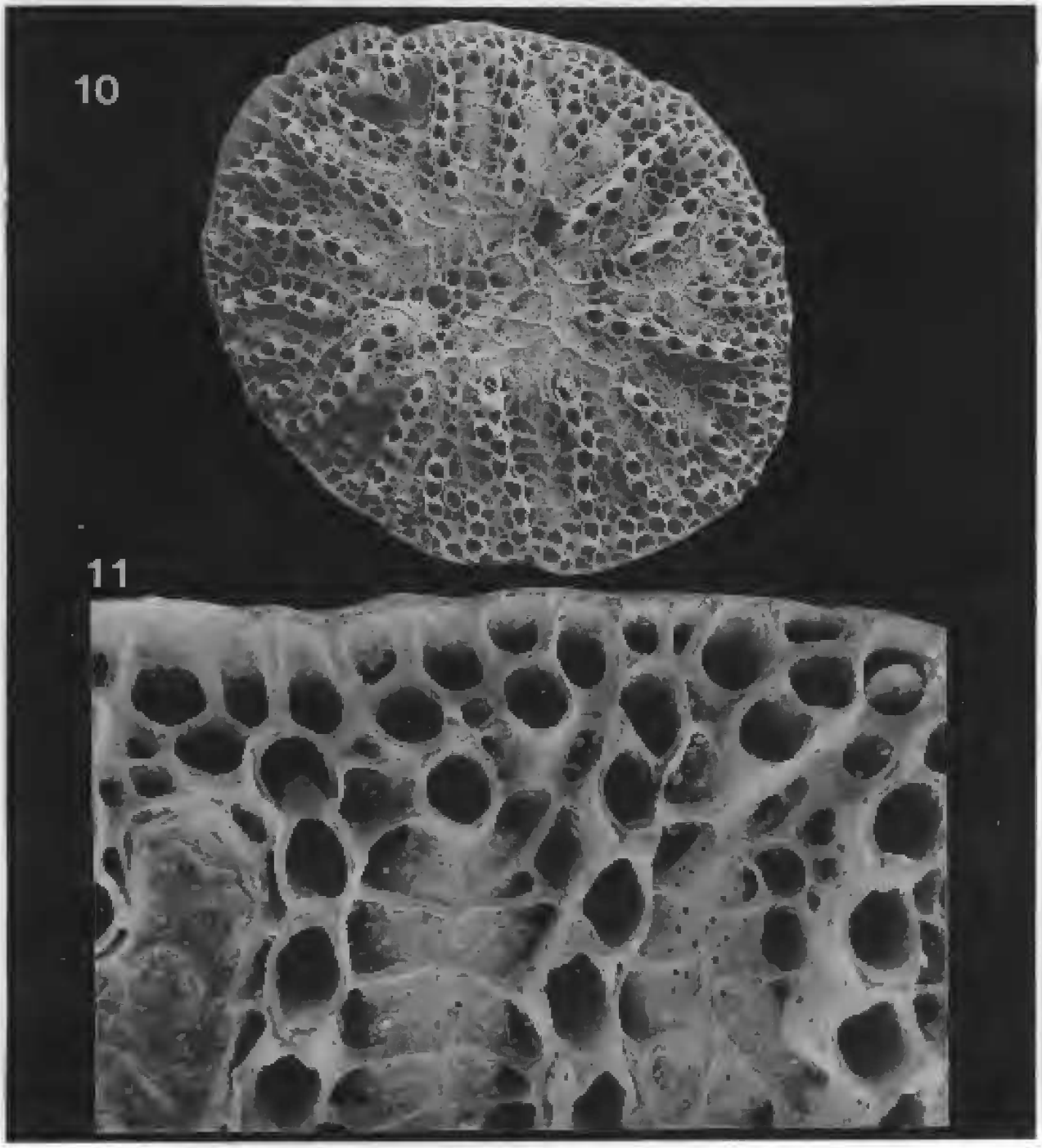
FIGURES 1–4. **1.** Part of holotype, A.88.161, of *Membranipora* (?) *cincta* Hutton, = *Diploporella alata* (Lamouroux), × 105. **2.** Part of holotype, A.88.162, of *Lepralia spicea* Hutton, = *Mucropetraliella ellerii* (MacGillivray), × 80. **3.** Part of paralectotype, A.88.160B, of *Lepralia pocula* Hutton, = *Mychoplectra pocula*, × 80. **4.** Part of holotype, A.88.159, of *Lepralia baccata* Hutton, = *Adeonellopsis baccata*, showing one gonozooid (gz) surrounded by several autozooids, × 72. (All specimens from Otago Museum).


5
6
7



FIGURES 8 AND 9. **8.** Part of holotype of *Escharn (?) huttoni* Tate *in* Hutton, A.88.157, = *Calyptotheca variolosa* (MacGillivray), × 55. **9.** *Mesonea radians* (Lamarck), part of specimen A.88.164, showing brood chamber and peristome, × 53. (Both specimens from Otago Museum).

FIGURES 5–7. **5.** Part of syntype, SAM L460 of *Adeonellopsis zietzii* MacGillivray, = *A. baccata* (Hutton), showing a gonozooid (at left), with characteristic compound spiramen and several autozooids with simple spiramen; **6** is of the same specimen as in 5, but tilted to show an autozooidal avicularium (av), both × 105 (specimen from South Australian Museum). **7.** Part of holotype, A.88.159 of *Adeonellopsis baccata* (Hutton) showing the interior of the frontal shields of an autozooid (left) and a gonozooid (right), × 205.



FIGURES 10 AND 11. *Lichenopora victoriensis* Waters, specimen A.88.148, Otago Museum, showing the ramifying brood chamber (part magnified in 11). × 56, × 300.

20. *Pustulipora porcellanica*. No specimen in collection. Currently, this Hutton (1873) species is known only from New Zealand, as *Galeopsis porcellanicus* (Gordon, 1989). To date, the only species of *Galeopsis* definitely recorded for South Australia is *G. longirostris* (MacGillivray, 1885b) (specimens in South Australia Museum).

21. *Tubulipora flabellaris*. No specimen in collection. *Tubulipora flabellaris* (Fabricius, 1780) is an arctic-boreal species, unlikely to occur in Australia (Hayward & Ryland, 1985). There are several samples of *Tubulipora* from South Australia in the South Australian Museum, none identified to species. Six species of the genus have been reported from Victoria.

22. *Discoporella novae-zealandiae* [sic] : ***Lichenopora victoriensis*** Waters, 1889b [*non Lichenopora novaezelandiae* (Busk, 1875)] (Figs 10, 11). A.88.148, 150.

23. *Discoporella fimbriatae* [*sic*]: ***Lichenopora echinata*** (MacGillivray, 1884) [*?non Disporella fimbriata* (Busk, 1875)]. (*Cf.* Waters 1889b: 282 – "A 'Challenger' specimen from Tristan da Cunha was submitted to me named *L. fimbriata*. This is *L. echinata* with an ovicell, so that the name *fimbriata* must be dropped"). A.88.149, 151.

Two additional species, not mentioned in Hutton's (1878) paper, are represented in the collection. These are *Steginoporella chartacea* (Lamarck, 1816), syn. *S. truncata* (Harmer, 1900) (A.88.174) and *Rhynchozoon* sp., possibly *R. delicaudum* (MacGillivray, in McCoy 1890: 356) (A.88.155). For the priority of *Steginoporella chartacea* over *S. truncata* see d'Hondt 1979: 18, 20.

Two of Hutton's (1878) names are senior synonyms of later-described species. Thus, *Adeonellopsis zietzii* MacGillivray, 1889 becomes *A. baccata* (Hutton, 1878), and *Pyripora polita* (Hincks, 1880) becomes *Mychoplectra poculo* (Hutton, 1878).

Acknowledgments

We sincerely wish to thank John Darby and Tony Harris of the Otago Museum for locating the Hutton Collection and making it available for study, P. Bock of the Royal Melbourne Institute of Technology for comments on *Calyptotheca variolosa* and *Schizoporella baccata*, and J. S. Ryland and P. J. Hayward for their critical reading of a draft.

References

AUDOUIN, J. V. 1826. Explication sommaire des planches de polypes de l'Egypte et de la Syrie, publiées par Jules-César Savigny. Pp. 225–244 *in* 'Description de l'Egypte, ou recueil des observations et des recherches qui ont été faites en Egypte pendant l'Expedition de l'Armée française . . . Histoire Naturelle'. Vol. 1, part 4. Imprimerie Impériale: Paris.

BOCK, P. E. 1982. Bryozoans (Phylum Bryozoa). Pp. 319–394 *in* 'Marine Invertebrates of Southern Australia'. Pt 1. Eds S. A. Shepherd & I. M. Thomas. Government Printer: South Australia. 491 pp. [And unpublished *Corrigenda* circulated 1987.]

BROOD, K. 1976. Cyclostomatous Bryozoa from the coastal waters of East Africa. *Zoologica Scripta* **5**: 277–300.

BROWN, D. A. 1958. Fossil cheilostomatous Polyzoa from south-west Victoria. *Memoirs of the Geological Society of Victoria* **10**: 1–90.

BUSK, G. 1852. 'Catalogue of marine Polyzoa in the collection of the British Museum, I. Cheilostomata (part)'. Trustees of the British Museum (Natural History): London. Pp. 1–54, pls 1–68.

BUSK, G. 1854. 'Catalogue of marine Polyzoa in the collection of the British Museum, II. Cheilostomata (part)'. Trustees of the British Museum (Natural History): London. Pp. 55–120, pls 69–124.

BUSK, G. 1859. 'A monograph of the Fossil Polyzoa of the Crag'. *Palaeontographical Society (Monographs)*: London. 136 pp., 22 pls.

BUSK, G. 1875. 'Catalogue of the cyclostomatous Polyzoa in the collection of the British Museum'. Trustees of the British Museum (Natural History): London. 39 pp., 34 pls.

CANU, F. & BASSLER, R. S. 1920. North American Early Tertiary Bryozoa. *Bulletin of the United States National Museum* **106**: 1–879, 162 pls.

FABRICIUS, O. 1780. 'Fauna Groenlandica'. J. G. Rothe, Hafniae & Lipsiae. 452 pp.

GORDON, D. P. 1989. The marine fauna of New Zealand: Bryozoa: Gymnolaemata (Cheilostomida Ascophorina) from the western South Island continental shelf and slope. *New Zealand Oceanographic Institute Memoir* **97**: 1–158.

GORDON, D. P. & PARKER, S. A. 1991. A new genus of the bryozoan family Electridae, with a plectriform apparatus. *Records of the South Australian Museum* **25**(2): 113–120.

HARMER, S. F. 1900. A revision of the genus *Steganoporella*. *Quarterly Journal of Microscopical Science* (n.s.) **43**: 225–297, 2 pls.

HARMER, S. F. 1915. The Polyzoa of the *Siboga* Expedition. Part 1. Entoprocta, Ctenostomata and Cyclostomata. *Siboga-Expeditie* **28a**: 1–180, 12 pls.

HASTINGS, A. B. 1932. The Polyzoa with a note on an associated hydroid. *Great Barrier Reef Expedition 1928–29. Scientific Reports* **4**(12): 399–458, 1 pl.

HAYWARD, P. J. & RYLAND, J. S. 1985. Cyclostome bryozoans. Keys and notes for the identification of the species. *Linnean Society Synopses of the British fauna* (n.s.) **34**. E. J. Brill/Dr W. Backhuys: London. 147 pp.

HINCKS, T. 1878. Notes on the genus *Retepora*, with descriptions of new species. *Annals and Magazine of Natural History* (5)**1**: 353–365, pls 18, 19.

HINCKS, T. 1880. Contributions towards a general history of the marine Polyzoa. II. Foreign Membraniporina (second series). *Annals and Magazine of Natural History* (5)**6**: 81–92, 376–381, pls 10, 11, 16.

HINCKS, T. 1881. Contributions towards a general history of the marine Polyzoa. IV. Foreign Membraniporina. *Annals and Magazine of Natural History* (5)**7**: 147–161, pls 8–10.

HINCKS, T. 1884. Contributions towards a general history of the marine Polyzoa. XIII. Polyzoa from Victoria (continued). *Annals and Magazine of Natural History* (5)**13**: 276–285, pls 8, 9.

HONDT, J.-L. d'. 1979. Revision des Bryozoaires de Lesueur et Péron conservés dans les collections du Muséum National d'Histoire Naturelle de Paris. *Bulletin Trimestriel de la Société Géologique de Normandie et des Amis du Muséum du Havre* **66**(3): 9–24.

HUTTON, F. W. 1873. 'Catalogue of the marine Mollusca of New Zealand, with diagnoses of the species'. Government Printer: Wellington. 116 pp., 1 pl. [Polyzoa pp. 87–104].

HUTTON, F. W. 1878. On some South Australian Polyzoa. *Papers and Proceedings and Report of the Royal Society of Tasmania for 1877–1878*: 23–25.

LAMARCK, J. B. P. A. de M. de. 1816. Polyzoa, *in* 'Histoire naturelle des animaux sans vertèbres . . . précédée d'une introduction offrant la détermination des caractères essentiels de l'animal, sa distinction du végétal et des autres corps naturels, enfin, l'exposition des principes fondamentaux de la zoologie'. **2**: 1–568. Verdière: Paris.

LAMOUROUX, J. V. F. 1821. 'Exposition méthodique des genres de l'ordre des polypiers, avec leur description et celles des principales espèces figurées dans 84 planches; les 63 premières apartenant à l'histoire naturelle des Zoophytes d'Ellis et Solander'. V. Agasse: Paris.

LINNAEUS, C. 1758. 'Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis'. Edn 10, vol. 1. Laurentii Salvii, Holmiae. 824 pp.

LINNAEUS, C. 1767. 'Systema naturae'. Edn 12, vol. 1, Regnum Animale. Laurentii Salvii, Holmiae. [Vol. 1, Part 1, pp. 1–532 (1766), Part 2, pp. 533–1327 (1767)].

McCOY, F. 1880. 'Prodromus of the Zoology of Victoria', vol. 1, decade 5: 1–58, 10 pls. Government Printer: Melbourne.

McCOY, F. 1890. 'Prodromus of the Zoology of Victoria', vol. 2, decade 20: 329–375, 10 pls. Government Printer: Melbourne.

MacGILLIVRAY, P. H. 1860a. On some new Australian Polyzoa. *Transactions of the Philosophical Society of Victoria* **4**: 97–98, 1 pl.

MacGILLIVRAY, P. H. 1860b. Notes on the cheilostomatous Polyzoa of Victoria and other parts of Australia. *Transactions of the Philosophical Society of Victoria* **4**: 159–168, pls 2, 3.

MacGILLIVRAY, P. H. 1869. Descriptions of some new genera and species of Australian Polyzoa; to which is added a list of species found in Victoria. *Transactions and Proceedings of the Royal Society of Victoria* **9**: 126–148.

MacGILLIVRAY, P. H. 1883. Descriptions of new, or little known, Polyzoa. Part II. *Transactions and Proceedings of the Royal Society of Victoria* **19**: 130–138, 3 pls.

MacGILLIVRAY, P. H. 1884. Descriptions of new, or little known, Polyzoa. Part VI. *Transactions and Proceedings of the Royal Society of Victoria* **20**: 126–128, 1 pl.

MacGILLIVRAY, P. H. 1885a. Descriptions of new, or little known, Polyzoa. Part VII. *Transactions and Proceedings of the Royal Society of Victoria* **21**: 92–99, 1 pl.

MacGILLIVRAY, P. H. 1885b. Descriptions of new, or little known, Polyzoa. Part VIII. *Transactions and Proceedings of the Royal Society of Victoria* **21**: 106–119, 5 pls.

MacGILLIVRAY, P. H. 1889. On some South Australian Polyzoa. *Transactions and Proceedings and Report of the Royal Society of South Australia* **12**: 24–30, pl. 2.

MAPLESTONE, C. M. 1913. New or little-known Polyzoa. *Proceedings of the Royal Society of Victoria* (n.s.) **25**: 357–362, pl. 28.

MILNE EDWARDS, H. 1836. Recherches anatomiques, physiologiques, et zoologiques sur les Eschares. *Annales des Sciences Naturelles* (2)**6**: 5–53.

ORBIGNY, A. D. d'. 1851–54. 'Paléontologie française. Description des Mollusques et rayonnés fossiles. Terrains Crétacés V. Bryozoaires.' Victor Masson: Paris. [Pp. 1–188 (1851); pp. 185 bis–472 (1852); pp. 473–984 (1853); pp. 985–1192 (1854); pls 600–800.]

RYLAND, J. S. 1984. Phylum Bryozoa. Pp. 68–75 *in* 'A Coral Reef Handbook'. 2nd edn. Ed. P. Mather. The Australian Coral Reef Society: Brisbane.

SMITT, F. A. 1868. Kritisk förteckning öfver Skandinaviens Hafs-Bryozoer. IV. *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar* **25**: 3–230, pls 24–28.

SOULE, D. F., SOULE, J. D. & CHANEY, H. 1991. Some little known genera of Thalamoporellidae: *Thairopora*, *Diploporella*, and new genera *Marupioporella* and *Thalamotreptos*. Pp. 447–464 *in* 'Bryozoaires actuels et fossiles: Bryozoa living and fossil'. Ed. F. P. Bigey *Bulletin de la Société des Sciences Naturelles de l'Ouest de la France, Mémoire* H.S. 1.

SOULE, J. D., SOULE, D. F. & CHANEY, H. W. 1987. Phyla Entoprocta and Bryozoa (Ectoprocta). Pp. 83–166 *in* 'Reef and shore fauna of Hawaii. Section 2: Platyhelminthes through Phoronida, and Section 3: Sipuncula through Annelida'. Eds D. M. Devaney & L. G. Eldredge. Bishop Museum Special Publication 64(2&3). Bishop Museum Press: Honolulu. 461 pp.

STOLICZKA, F. 1865. Fossile Bryozoen aus dem tertiären Grünsandsteine der Orakei-Bay bei Auckland. *Reise der Österreichischen Fregatte 'Novara' um die Erde in den Jahren 1857, 1858, 1859 . . . Geologischer Theil* **1**(2): 89–158, pls 17–20.

TAYLOR, P. D. & COOK, P. L. 1981. *Hippoporidra edax* (Busk, 1859) and a revision of some fossil and living *Hippoporidra* (Bryozoa). *Bulletin of the British Museum (Natural History), Geology* **35**: 243–251.

VOIGT, E. 1984. Die Genera *Reteporidea* d'Orbigny, 1849 und *Crisidmonea* Marsson (Bryozoa Cyclostomata) in der Maastrichter Tuffkreide (Oberes Maastrichtium) nebst Bemerkungen über *Polyascosoecia* Canu & Bassler und andere ähnliche Gattungen. *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg* **56**: 385–412.

WATERS, A. W. 1887. Bryozoa from New South Wales, North Australia, &c. Part II. *Annals and Magazine of Natural History* (5)**20**: 181–203, pls 5, 6.

WATERS, A. W. 1889a. Bryozoa from New South Wales. Part IV. *Annals and Magazine of Natural History* (6)**4**: 1–24, pls 1–3.

WATERS, A. W. 1889b. On the ovicells of some Lichenoporae. *Journal of the Linnaean Society, Zoology* **20**: 280–285, pl. 15.